Information Systems Frontiers
https://doi.org/10.1007/s10796-022-10351-9

Exploring the Role of Organizational Mindfulness on Cloud Computing and Firm Performance: The Case of Kenyan Organizations

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Accepted: 11 October 2022

Abstract
The popularity and use of cloud computing has largely been driven by the reported benefits on firm performance. Despite this technology providing a paradigm shift in information technology (IT) services, the process through which the adoption of cloud computing effects organizational performance in the context of developing countries is still unclear. The aim of this study is to provide a theoretical discussion that advances our understanding about the mediating and moderating roles of organizational mindfulness in the context of cloud computing adoption and organizational performance. A research model is developed and tested using structural equation modelling. A firm level cross sectional survey was conducted on a sample of 180 organizations in the financial, manufacturing and IT sectors in Kenya. The findings reveal that organizations need to systematically develop mindfulness capabilities to benefit from the adoption of cloud, and IT innovations in general. The study has implications for research and practice.

Keywords Cloud computing · Adoption · Organizational mindfulness · Firm performance

1 Introduction

Cloud computing has revolutionized the way organizations from across all sectors and industries access and use computer infrastructure and services (Lee et al., 2022; Wang et al., 2022). Cloud computing provides users with on-demand access to a collective pool of configurable computing resources supplied as a service over a network with minimal managerial supervision (Hsu, 2022; Chen et al., 2022; Liu et al., 2020; Alzadjali & Elbanna, 2020). In contrast to traditional IT services that required organizations to incur high capital expenditures and operating costs, cloud computing obviates the need for such costs due to its metered and on-demand usage business model (Vithayathil, 2017; El-Haddadeh, 2020). The utility of cloud computing has attracted interest from organizations due to its reported benefits including; minimal upfront capital costs and rapid elasticity (Vithayathil, 2017), high speed of deployment and access to quality software (Lee et al., 2013), better decision making (Lauras et al., 2015), and cloud data analytics (Preuveneers et al., 2021). Yet, organizations are hesitant to adopt cloud computing because they do not have direct control over the cloud services (Lee, 2019). Further, concerns about cloud technology remain, including, security and privacy of the data (Spanaki et al., 2019), reliability and availability of cloud services (Voorsluys et al., 2011), corporate culture and change management (Vithayathil, 2017), economics (Jung et al., 2012; Martens & Teuteberg, 2012; Mazhelis & Tyrväinen, 2012), and cloud computing reversibility (Bouaynaya, 2020). Despite these concerns, Fortune Business Insights (2022) predicts that the current cloud computing market worth over USD 400 billon will grow to over USD 760 billion by 2027.

Cloud computing has been studied from various perspectives that focused on different aspects of this phenomenon such as the benefits of cloud computing (Armbrust et al., 2010), models of cloud computing (Mell & Grance, 2011), technical issues (Buyya et al., 2009; Gutierrez-Garcia & Sim, 2012), adoption (e.g., Adane, 2018; Adendorff & Smuts, 2019; Lin & Chen, 2012; Stieninger et al., 2014; Tripathi, 2019), and impact on organizational performance (De Stefano et al., 2020; Gangwar, 2017; Nicholas-Donald, 2015).

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Published online: 04 November 2022

Despite the important contributions of previous studies to advancing knowledge about cloud technology, it widely accepted that cultural and infrastructural differences between developed and developing countries significantly influence the adoption of new technologies (Sabi et al., 2018). While a number of studies in cloud computing adoption and its impact on organizations have been conducted in developed countries, such as Australia (e.g., Ali et al., 2022), Germany (Karunagaran et al., 2019), the UK (Jones et al., 2019), and the US (Nicholas-Donald, 2015), the findings from those studies can be difficult to generalize to developing countries. In the context of developing countries, studies have examined the adoption of cloud computing services for e-government initiatives in Oman (i.e., Alzadjali & Elbanna, 2020) and India (Singh et al., 2020), and at four universities in sub-saharan Africa (i.e., Cameroon, Ghana, Nigeria, and Uganda) (i.e., Sabi et al., 2018). While such studies have provided new insights and understanding of this phenomenon in new contexts, there is a noticeable absence of rigorous research that examine the adoption of cloud computing services in the private sector of developing countries. This is concerning as previous studies have reported that cloud computing positively impacts organizational performance and economic growth (Chang, 2020; De Stefano et al., 2020; Gangwar, 2017; Nicholas-Donald, 2015), the mechanism through which this impact is achieved in the context of developing countries has not yet adequately been empirically or theoretically explored. Against this background, this study is motivated to answer the following research question, *"What is the mechanism through which cloud computing adoption impacts organizational performance in the context of Kenya?"*.

To answer this question, we adopt the theory of organizational mindfulness (OM) as a theoretical lens to understand and explain the process through which cloud computing adoption can impact organizational performance in the private sector organizations in Kenya, a developing country. Organizational mindfulness has been identified as a promising paradigm to study the IS phenomenon (Fichman, 2004; Swanson & Ramiller, 2004), though its application has not been widely extended to understanding mechanisms through which IT innovations impact organizational performance. Previous studies applying organizational mindfulness in IS research have largely focused on IT adoption decisions (e.g., Goswami et al., 2009; Sun et al., 2016) and post-adoption use of IT innovations (Culnan et al., 2010; Nevo & Nevo, 2012). Dernbecher and Beck (2017) suggest that mindfulness can be applied as an accelerator in nomological nets. Hence, this study employs organizational mindfulness to explain the mechanism through which cloud computing adoption impacts organizational performance, whether it acts as an accelerator or decelerator through its moderating effects or mediating effects. This study, therefore, extends the application of organizational mindfulness in IS research by exploring its mediating and moderating roles as a way of explaining how cloud computing adoption impacts organizational performance in the context of Kenya, a developing country.

The remainder of this paper is structured as follows. First a review of literature on cloud computing and its context in Kenya is presented. Then the theory of organizational mindfulness and it uses in IS studies is provided. Next, the research hypothesis and proposed model is presented. The findings and analysis are then discussed. Followed by a discussion of the findings and its implications for research and practice. The paper ends with a conclusion.

2 Related Literature

Cloud computing can be traced back to 1961 MIT centennial, when John McCarthy first exposed the idea of 'Utility Computing' (Cafaro & Aloisio, 2011). Cloud computing has been defined as the provision of IT solutions as a service rather than as a product through the internet (Senyo et al., 2016). Cloud computing services are delivered in terms of three models, namely, (i) cloud service models, (ii) cloud deployment models, and (iii) the cloud consumption model.

Cloud computing service models are mainly referred to as cloud service layers. These layers have been variously referred to as cloud service models (Sriram & Khajeh-Hosseini, 2010), cloud business models (Yang & Hsu, 2011; Zhang et al., 2010), and cloud architectural layer (Stanoevska-Slabeva & Wozniak, 2010). The earliest classification known as the SPI model (Ahson & Ilyas, 2011) stratified cloud services into software-as-a-service (SaaS), platform as a service (PaaS) and infrastructure-as-a-service (IaaS) (Yang & Hsu, 2011; Zhang et al., 2010). The SaaS layer provides applications that run on the cloud eliminating the need to install and run the applications on the client computer (Marston et al., 2011). SaaS is a software that is owned, delivered and managed remotely by one or more providers and offered on a pay-per-use mode (Stanoevska-Slabeva & Wozniak, 2010). PaaS facilitates the development and deployment of applications by providing operating system support and software development frameworks mainly for software and apps developers. PaaS eliminates the cost and complexity of managing the underlying hardware and software layers required during software development. IaaS is an established paradigm in cloud computing for the provisioning of baseline computing resources and services such as computational power and data servers that are virtualized (Yuan et al., 2018, 2022; Lai & Yu, 2012).

Cloud deployment models are classified according to three features, namely, (i) physical location, (ii) distribution, and (iii) the owner of the cloud data center (Buyya

et al., 2011; Ristol, 2010). The cloud deployment models are service agnostic, implying that each service model can be deployed as private, public or hybrid cloud (Buyya et al., 2011; Chunlin & LaYuan, 2017).

Cloud consumption model offers a unique way to consume computation, network, storage, and software resources. The characteristics of cloud computing are *on-demand self-services* (e.g., the consumer can unilaterally provision computing capabilities without the provider's intervention, *broad network access* (e.g., provides capabilities over the internet for different users and services; 3) *resource pooling* (e.g., service to be used on a need basis by the consumer; and 4) *a measured service* (e.g., consumers are billed based on consumption) (Buyya et al., 2011).

3 Cloud computing in Kenya

Organizations in the financial, technology, and manufacturing sectors were selected for this study as these sectors remain the top adopters of cloud computing amongst industries (Kirkland, 2019). Further, the Information and Communications Technology (ICT) Authority of Kenya asserts that Kenya is a leading country when it comes to ICT innovation in Africa and remains a host to multiple continental ICT hubs including IBM's first African research lab and Google's first sub-Saharan African office. The presence of these hubs and multinational corporations make Kenya well positioned for cloud computing adoption and to act as an exemplar for other developing countries, especially in Africa. Regarding adoption of cloud services amongst the private and public sectors, cloud service providers showed that 30 percent of their clients were from the public sector, 60 percent from the private sector and 10 percent from non-governmental organizations (Walubengo, 2017).

The growing interest in cloud computing by organizations in Kenya and more so the public sector can be attributed to the national ICT policy and regulatory frameworks that were created in 2019. The policy, with its vision of a globally competitive knowledge economy, states the government's commitment to facilitate the creation of infrastructure and frameworks that support the growth of data centers, emerging technologies and foster a secure innovation system (Ministry of Information, Communications and Technology, 2019a). Additionally, the Kenyan government recognizes that the adoption of cloud computing and emerging technologies are expected to transform the Kenyan economy (Ministry of Information, Communications and Technology, 2019b). The development of a national strategy and regulatory frameworks by the Kenyan government has accelerated the adoption of digital technologies in both the public and private sectors, which has placed Kenya as one of the leading countries in terms of digital integration and the economy (Namunwa, 2022).

4 Organizational Mindfulness

Mindfulness is a psychological notion that reflects upon the cognitive qualities of the individual (Langer, 1989). While the concept of mindfulness had historically been used at the level of the individual for analysis, it can also be used at the group (Ioannou et al., 2022) or organizational level of analysis (Dennehy et al., 2021). At the organizational level, mindfulness is an organization's cognitive processes of revealing and redirecting new events and their erroneous consequences (Weick & Sutcliffe, 2001). As a decision maker characteristic, mindfulness allows managers to resist bandwagon pressure and to instead implement alternative solutions, thereby avoiding disadvantageous outcomes for the organization (Fiol & O'Connor, 2003). Organizational mindfulness (OM) therefore, reflects an organization's flexibility and reliability in the enactment of organizational routines (McAvoy et al., 2013). Since Organizational mindfulness is a function of social practices involving both action and communication (Weick & Roberts, 1993), it becomes embedded in organizational culture. Organizational mindfulness is evident when leaders create cultures that encourage rich thinking and capacity for change (Ray et al., 2011). Organizations adopting IT innovations like cloud computing are faced with a variety of risks and other related uncertainties that can only be handled through High Reliability Organizations (HRO) principles of organizational mindfulness (Enya et al., 2019). Further, mindful organizing, is a gestalt state that produces an awareness of expectations with a nuanced appreciation of an organization's specific context and alertness to unprecedented situations (Mu & Butler, 2009). It benefits organizations in uncertain environments more than organizations in a stable environment (Su, 2017). There are five antecedents of OM are (i) preoccupation with failure, (ii) commitment to resilience, (iii) reluctance to simplify interpretations, (iv) sensitivity to operations, and (v) under specification of structures (Weick et al., 1999).

Preoccupation with failure is an aspect of organizational mindfulness in which an organization is constantly concerned about failures even though they seldom arise (Dernbecher & Beck, 2017). Preoccupation with failure is concerned with converting errors and failures into opportunities for improvement by assuming that failures and near failures depict the overall health of the entire system (Butler & Gray, 2006). Organizations depicting mindfulness rarely focus on successes but encourage and reward reporting of failures as a way of learning about their systems (Weick et al., 1999). Cloud computing services are known to be vulnerable to outages and security breaches and therefore organizations

adopting them must continuously monitor any failure or outage. Further, they must also monitor any variation in service quality as a way of determining the overall health of the organization since they rely on services provided by third party cloud service providers (CSPs). All the personnel in the organization should be encouraged to report even small variations in the quality of the services provided and significant organizational effort should be expended to review them (Weick & Sutcliffe, 2001). Each aspect of availability should be carefully considered when engaging with a CSP, negotiated as part of the service level agreement (SLA) and tested in failover drills (Mather et al., 2009). Generally, the process of adopting and implementing any IT innovation (like cloud computing) is itself prone to failure, and reflective attention to possibilities for failure in this domain also enlarges mindfulness (Swanson & Ramiller, 2004).

Reluctance to simplify interpretation refers to organizations that consider simplifications to create a tendency of overlooking threats and their potential consequences. According to Butler and Gray (2006), mindful organizations have the desire to continually see problems in different perspectives and they resist the temptation to settle into simplified and reproducible heuristics in interpretating events (Swanson & Ramiller, 2004). Such a reluctance to simplify interpretations applies to organizations operating in a cloud environment in several ways. Cloud computing itself is a complex innovation with several service, deployment and consumption models (Zhang et al., 2010). Managing the interaction amongst these models introduce technological and contractual challenges for organizations (Marston et al., 2011). Through reluctance to simplify interpretations, organizations are able to understand these challenges and uncertainties from different perspectives by increasing their employees' sensing capabilities (Dernbecher & Beck, 2017).

Sensitivity to operations or situational awareness involves having individuals in the organization who have an integrated big picture of operations in the moment and are able to "act thinkingly" (Weick et al., 1999, p. 43). The mindful organization attends vigilantly to small and seemingly insignificant details in day to day operations (Swanson & Ramiller, 2004). Specifically, situational awareness entails cognition and comprehension of the present situation and its impact on the future (Weick et al., 1999). This kind of cognition is important because future catastrophes usually emanate from current minor errors and random events which may result from, for example, the lack of standards in cloud computing (Marston et al., 2011).

Commitment to resilience is an organization's capability to anticipate and resiliently absorb an occurring event but nevertheless endure its operations (Weick et al., 1999). The endurance in operations is facilitated by the tendency to cope with dangers and problems as they arise through error detection and error containment (Butler & Gray, 2006). This approach is in contrast to anticipation- a case where organizations deal with surprises by weeding them out in advance (Weick et al., 1999). Anticipation is achieved through planning and design of contingency measures for every possible unfavorable outcome. Commitment to resilience takes recognition that anticipation through planning and contingency measures is always incomplete. Resilience favors improvisation over planning, adaptation over routine, and effectiveness over efficiency (Swanson & Ramiller, 2004). For this purpose, mindful organizations rely on experts who pool their knowledge in self organized and informal networks to support improvisation (Bourrier, 1996; Weick et al., 1999). In the context of cloud computing, commitment to resilience should assume a significant role to ensure reliability in the cloud ecosystem. The cloud ecosystem is vulnerable to domino effects resulting from the network of distributed devices, services, and organizations. These networks must be orchestrated to provide user services transparently. An interruption in any of the networks will cascade to the rest of the cloud ecosystem. Cloud adoption challenges like security (Buyya et al., 2011; Kim, 2009) and availability (Buyya et al., 2011; Kim, 2009) are joined at the hip. A security problem such as denial-of-service (DOS) attack will lead to data unavailability. This interrelationship of various networks in a cloud environment leads to uncertainty and unpredictability of possible challenges that may arise in a cloud ecosystem. Managing the unexpected require that organizational business continuity strategies create a context and culture in which individuals and organizational units are better able to practice resilience and reliability in the face of unexpected events (Butler & Gray, 2006).

Under-specification of structures refers to loosening the hierarchical constraints to handle new problems with a wider range of capabilities and by individuals with the highest expertise (Dernbecher & Beck, 2017). In organizations that manifest under-specification of structures, hierarchical rank is subordinated to expertise and experience. It involves allowing decision making to migrate with the problems (Weick et al., 1999). Under-specification of structure can further be viewed as the readiness to relax formal structures so that authority for action can flow to the individuals and the units with the requisite expertise (Swanson & Ramiller, 2004). The cloud computing ecosystem is replete with challenges that include security and privacy, vendor lock-in, regulatory ambiguity (Kim, 2009), integration, customization (Stanoevska-Slabeva & Wozniak, 2010). When a service outage occurs in a cloud environment, those affected will turn to individuals with expertise and experience to address the anomaly. This implies a subtle loosening of hierarchy in favour of expertise (Weick & Sutcliffe, 2001).

4.1 Mindfulness in IS Studies

The foundations for the importance of mindfulness as a promising paradigm to study phenomena in IS research were laid by Fichman (2004) and Swanson and Ramiller (2004). In IS research, mindfulness has mainly been used as either a prerequisite, an accelerator or as an outcome (Dernbecher & Beck, 2017) in nomological nets. When mindfulness is used as a prerequisite, then it is treated as an exogeneous variable in various areas of investigation (i.e., Fichman & Melville, 2014; Leung et al., 2014; Teo et al., 2011). As an accelerator, mindfulness is conceived as either mediating or moderating the effect between input and out variables. Mindfulness has been found to positively moderate the relationship between initial beliefs about a system and the intention to use it (Sun, Fang, & Zou, 2016) and increases the influence of top management support on IS performance (Khan et al., 2013). When categorized as an outcome or implication, mindfulness becomes an endogenous variable as when the ubiquity of an IT innovation triggers cognitive or behavioral practices that enhance or hinder mindfulness (Dernbecher & Beck, 2017).

Mindfulness as an accelerator has been used in IS studies (e.g., Dernbecher et al., 2014; Wolf et al., 2011; Ye et al., 2022; Rodrigo et al., 2022) at the individual level and at the organizational level (e.g., Wolf et al., 2012). These studies have provided many contributions to advancing knowledge, but they were not conducted within the context of cloud computing and firm performance. It has been averred that situating mindfulness within organizational contexts is critical (Good et al., 2016; Sutcliffe et al., 2016) since context is an active element that influences the phenomenon under investigation (Davison & Martinsons, 2016; Priandi et al., 2019). Additionally, there has been a call to IS researchers to investigate the reciprocal relationship between mindfulness as shaping IT and at the same time being reshaped by IT (Dernbecher & Beck, 2017).

5 Hypothesis Development and Research Model

5.1 Cloud Computing Adoption and Firm Performance

Cloud computing adoption is the use of internet based technologies to conduct business (Armbrust et al., 2010). The major goal of cloud computing adoption is to reduce the cost of IT services while increasing processing throughput, reliability, availability, and flexibility of business operations. Cloud computing adoption involves the use of any of the cloud computing service models by an organization. These service models include Software as a Service (SaaS), Platform as a Service (PaaS) and Infrastructure as a Service (IaaS). Firm performance is a subset of organizational effectiveness that covers operational and financial outcomes (Santos & Brito, 2012). Firm performance has been used by previous studies as a proxy for measuring the quality of IT innovation adoption (Fichman, 2004). The quality of IT innovation adoption is the extent to which an organization has adopted the right innovation, at the right time, and in the right way (Haner, 2002). The direct impact of IT innovations on firm performance is observable when the innovation facilitates or supports current processes, routines, work policies or product/service offerings (Zand, 2010). These effects translate to lower variable costs of production and lower prices and subsequently to higher sales if demand is price-elastic.

Studies investigating the impact of IT adoption on firm performance have produced mixed results. Two streams of research on IT adoption and firm performance can be distinguished. First, the stream focusing on the IT productivity paradox posits that despite enormous spending on IT, the benefits have not been found in aggregate firm performance statistics (Dos Santos et al., 1993). The second stream indicates that IS has made a significant contribution to firm output (Brynjolfsson & Hitt, 1993). Despite this IT productivity paradox, most studies on enterprise systems have found that their adoption improved firm performance. A study on adoption of groupware found that supply chain management systems improved the performance of SMEs (Shin, 2006). Another study on enterprise systems adoption and firm performance found that enterprise systems categories affect innovation and affect revenue, productivity and market share positively (Zand, 2010). Specifically, cloud computing adoption has also been found to enhance firm performance. Successful adoption of cloud computing has been found to positively affect firm performance for the cloud supported operations (Garrison et al., 2015). In Malaysia, a study on manufacturing firms concluded that cloud computing adoption impacted firm performance positively (Ooi et al., 2018). Recently, more studies conducted in different contexts have shown that cloud computing adoption has positive effect on organizational performance (Al-Azzawi & Kaya, 2021; Chen et al., 2022; Kaya & Al-Azzawi, 2021; Lee et al., 2022). Additionally, it has also been found that organizations adopt cloud computing with the intention of improving firm performance (Khayer et al., 2020; Stieninger et al., 2018). Thus, we hypothesize:

> H1: There is a positive relationship between cloud computing adoption (CCA) and firm performance (FP) within the context of organizations in Kenya.

5.2 Cloud Computing Adoption and Organizational Mindfulness

Cloud computing adoption and its management presents several challenges to organizations. The challenges include security and privacy of data, reliability and availability of the cloud services, vendor management and regulatory ambiguity. Further, like the adoption of any IT innovation, cloud computing adoption may require organizational re-engineering and restructuring (Brynjolfsson et al., 1998). These challenges require that an organization should always be on the outlook for any sign of failure or near failure and use such opportunities for learning. Adoption of cloud computing therefore motivates an organization to act with some degree of mindfulness to succeed. Butler and Gray (2006) theorize that individuals and organizations achieve reliability when creating, managing and using complex and imperfect systems based on appropriate cognition such as mindfulness-based approaches. A study of agile software development concluded that collective mindfulness is one of the emergent capabilities of an agile team (Vidgen & Wang, 2009). Studies of high reliability organizations (HRO) have used mindfulness as a means of mitigating the potentially negative consequences of bandwagon behavior (Wolf et al., 2012). Finally, a study on the role of mindfulness in mobile business intelligence (BI) adoption established that the enthusiasm of the executive and users affect the decisions of a company to adopt mobile BI (Tona & Carlsson, 2014). These studies examined the direct role of mindfulness on IT innovation adoption. To extend the application of OM as a lens for understanding IT innovation (i.e., cloud computing), this study investigates the influence of IT innovation adoption on mindfulness. The enabling role of IT innovation on mindfulness has been investigated considering the reliability aspects of IT use and outcomes. IT intensive organizations and HROs share similar characteristics in the sense that any small error can have serious consequences in both kinds of organizations (Valorinta, 2009). Further, Valorinta (2009) notes that heightened attention and an enriched action repertoire that is usually manifested by IT intensive organizations enable mindfulness. IT mindfulness exerts a relatively enduring interest in investigating IT features and failures (Thatcher et al., 2018). Mindfulness can also be studied as an implication resulting from input of an IS artifact and that IT adoption facilitates mindfulness (Dernbecher & Beck, 2017). Thus, we hypothesize:

H2: There is a positive relationship between cloud computing adoption (CCA) and organizational mindfulness (OM) within the context of organizations in Kenya.

5.3 Organizational Mindfulness and Firm Performance

Advocates of the 'bandwagon effect' posit that organizations adopt IT innovations due to pressure from other organizations that have already adopted it (Fiol & O'Connor, 2003). This pressure on non-adopters to adopt results into bandwagon behavior. But even if an organization provisionally adopts an innovation as a result of bandwagon behavior, charting a successful course of implementation that results into positive firm performance demands continued vigilance in maintaining and updating its conceptual framework (Swanson & Ramiller, 2004). To chart a successful course of implementation, organizational mindfulness is needed. In a conceptual paper, Fichman (2004) hypothesized that organizations that exhibit greater organizational mindfulness will have more beneficial performance impacts for any given level of innovation. Extant literature (Baker, 2007; Liozu & Hinterhuber, 2012) indicates that there is a positive relationship between organizational mindfulness and business performance.

An empirical study on CEO championing of pricing found that organizational mindfulness is positively related to firm performance (Liozu & Hinterhuber, 2013). This is supported by the fact that decision makers in mindful organizations defer pricing decisions to centre-led pricing experts within the organization in order to optimize pricing decisions and firm performance (Liozu & Hinterhuber, 2012). Organizational mindfulness was found to be a discriminating factor for firm performance (Eastburn, 2018) and it has a indirect positive impact on firm performance (Nguyen et al., 2020). Thus, we hypothesize:

H3: There is a positive relationship between organizational mindfulness (OM) and firm performance (FP) within the context of organizations in Kenya.

5.4 Cloud Computing Adoption, Organizational Mindfulness, and Firm Performance

While a number of studies (e.g., Gangwar, 2017; Hitt et al., 2002; Shin, 2006; Son et al., 2011) already link cloud computing adoption to firm performance, the mechanism through which firms can attain positive performance is yet to be adequately addressed. To this end, this study attempts to answer the question regarding how organizations innovate with IT. Organizations innovate with IT by mindfully attending to their facts and specifics (Swanson & Ramiller, 2004). By incorporating organizational mindfulness into research on IT innovation, our understanding of the mechanisms that operate between IT adoption and firm performance can be extended (Fichman, 2004). Organizations benefit from mindfulness when dealing with

bandwagon phenomenon in turbulent environments (Wolf et al., 2009). A recent study on achieving time-sensitive organizational performance through mindful use of technology and routines concluded that there is an association between mindful use of technologies and organizational performance in contexts with high technology adoption (Gardner et al., 2017). Further, mindfulness can be studied as an accelerator that amplifies the effect between the input and output variable in the sense of being a mediator (Dernbecher & Beck, 2017). For example, it has been shown that mindfulness mediates the relationship between top management support and IS performance (Khan et al., 2013). Thus, we hypothesize:

H4: Organizational mindfulness (OM) mediates the relationship between cloud computing adoption (CCA) and firm performance (FP) by organizations in Kenya.

As adopters of IT innovations often face significant challenges in acquiring the knowledge needed to utilize the innovations effectively (Fichman & Kemerer, 1997), there is an urgent need to understand and explain how organizational mindfulness creates opportunities for learning with regard to the implementation of IT innovations (Fichman, 2004). Accordingly, Swanson and Ramiller (2004) recognize the dual role of organizational mindfulness in enhancing the recognition of organizational circumstances demanding an innovative response and also fostering effectiveness in executing the response itself. Organizational mindfulness can lead to accelerated business process performance in the face of information overload (Wolf et al., 2009). Mindful organizations, apart from making IT innovation adoption decisions based on their organizational specifics will also make better decisions throughout the implementation process leading to increased firm performance. For example, a study by Dennehy et al., (2021) examined the nomological network of associations between collective mindfulness and big data analytics in fostering resilient humanitarian relief supply chains and demonstrated that organizational mindfulness is key to enabling SC resilience, as opposed to just the big data analytics itself. Further, organizational mindfulness has been known to have an accelerating effect between input and output variables in the sense of being a moderator (Dernbecher & Beck, 2017). For example, a study by Sun xx found that mindfulness positively moderates the relationship between initial beliefs about a system and the intention to use it (Sun, 2011). Thus, we hypothesize:

H5: Organizational mindfulness (OM) has a positive moderating effect on the positive relationship between cloud computing adoption (CCA) and firm performance (FP).

6 Research Methodology

6.1 Research Design

In this study, we relied on the theoretical underpinning of organizational mindfulness to develop a *priori* model to guide the study (cf. MacKenzie et al., 2011). Once the model was developed, a pool of survey items was derived from extant literature. The study used a cross-sectional survey to gather data from the respondents. The cross-sectional survey has been found to be robust for effects of relationship in previous IS studies (e.g., Tripathi, 2019; Palos-Sanchez et al., 2017; Teo et al, 2003, Liang et al., 2007; Wolf et al., 2009). In cases where there is a *priori* research model, like in this study, a cross-sectional study is suitable as it provides a basis for establishing generalizability, replicability and statistical power (Teo et al., 2003).

The null hypothesis significance testing theory (NHST) (Neyman & Pearson, 1928) was employed to test for evidence of relationships among the variables. The NHST is a method of statistical inference by which an experimental factor is tested against an hypothesis of no relationship based on a given observation effect (Pernet, 2016). The partial least squares structural equation modeling (PLS-SEM) technique was used to test a prior research model that comprised CCA, FP and MO. PLS-SEM is a single systematic statistical technique for testing and estimating causal relationships amongst latent variables (Urbach & Ahlemann, 2010). Whereas the use of PLS- SEM is almost mature in marketing and management research when it comes to testing relationships amongst latent variables (Chang et al., 2016), its use is emerging in information systems research (Mican et al., 2020). PLS-SEM is suitable for exploratory research since it conducts path analysis, factor analysis and regression analysis simultaneously. Further, PLS-SEM has been used in several information systems studies (Chang et al., 2016; Hasan et al., 2018; Jianwen & Wakil, 2019; Ringle et al., 2012).

6.2 Model Development

The aim of the study was to examine the process through which cloud computing adoption impacts firm performance. The process was conceptualized in the form of a PLS-SEM model comprised of the relationships amongst cloud computing adoption, organizational mindfulness, and firm performance. A PLS-SEM model normally has two elements, the structural model, and the measurement model. The structural model accounts for the latent variables and their relationships. The structural model for this study comprised of cloud computing adoption,

organizational mindfulness, and firm performance as latent variables. The study adapted previously validated scales from the literature on organizational mindfulness, cloud computing adoption and firm performance. The measurement model comprised of the indicators and their relationships with relevant latent variables. Each of the latent variables was estimated using second order reflective indicators. Reflective indicators, as opposed to formative indicators are commonly used in cases where the latent variable exists separately at a deeper and more embedded level than its indicators with the implication that a change in the focal latent variable will reflect in all of its indicators (MacKenzie et al., 2011). The study modelled the latent variables as reflective indicators since that is the norm in most information systems PLS-SEM based studies (Urbach & Ahlemann, 2010). Further, according to MacKenzie et al,(2011), constructs are not inherently formative or reflective in nature but are modeled as either formative or reflective depending on the researcher's definition of the conceptual construct.

The study adapted a six items scale to measure cloud computing adoption (CCA) (Ahson & Ilyas, 2011; Yang & Hsu, 2011; Zhang et al., 2010). Each of the scale items was considered an indicator. The organizational mindfulness scale comprising 20 items clustered into five (5) indicators was adapted from extant literature (Dernbecher et al., 2014; Ray et al., 2011; Wolf et al., 2009). Firm performance (FP) was measured through four (4) items which included revenue growth, productivity enhancement, market share change and profitability (Haner, 2002; Zand, 2010). For this study, the indicators for each latent variable are presented in Table 1. The indicators and their relationships with the latent variables represent the measurement model. A complete PLS-SEM model places together the measurement and the structural model.

The structural model distills the causal relationships amongst the latent variables in terms of paths, where each path (for example, H1, H2, H3 and H5) is an hypothesis for testing a theoretical proposition (Lowry & Gaskin, 2014). The structural model for the study is represented by Fig. 1.

NB: H4 is derived indirectly through the mediation analysis procedure.

6.3 Sample Profile and Data Collection

The data for the study was collected from firms in the financial, manufacturing and the ICT sectors in Kenya. The details of firms in the financial sector were retrieved from the Central Bank of Kenya (2020) and the Insurance Regulatory Authority website (2020) websites as there is no single repository of all the firms in the Kenya's financial sector. There is a total of 113 licensed firms in the financial sector as follows: 43 banking institutions, 14 mortgage companies and 56 insurance companies. The list of licensed firms in the ICT sector was retrieved from the Communications Authority of Kenya (2019), the regulator of the ICT sector in Kenya. These firms are categorized by the regulator in terms of the services they offer. For this study, firms in the Content Service Providers category were sampled. This decision was arrived at because Content Service Providers are likely to use cloud computing services compared to other categories. There are 221 licensed content service providers from a total of 2987 licensed firms in the ICT sector. For the manufacturing sector, 627 large manufacturing firms were extracted from the Kenya Manufacturing Association Handbook (2018).

The sample size of the study was 180 firms, comprising of 60 firms from each sector. Stratified random sampling was used to draw 60 firms from each of the sectors. Since the research model had four parameters to be estimated, the minimum required sample size was 80 following the N:q ratio. In the N:q ratio, N = number of cases and q = number of model parameters to be estimated (Jackson, 2003). The recommended N:q ratio for structural equation modelling is 20:1 (Kline, 2010). In the study's research model (Fig. 1), there are four model parameters to be estimated. The parameters are represented by the paths; CCA- > OM, OM- > FP, CCA- > FP and OM*CCA- > FP. Therefore, the required minimum sample size was 80. However, more data (100 samples) than the minimum requirement was collected to take care of possible non-response or incomplete responses.

An online questionnaire was designed using Survey Monkey® and sent to managers having ICT related responsibilities in each of the sampled firms. The managers acted as respondents on behalf of their respective firms. The ICT managers were selected as respondents because extant literature in management indicates that the perceptions of top management reflects the collective posture of the organization and therefore the opinions of top managers are considered as reliable sources of firm level data (Pecotich et al., 2003). To increase the response rate, four rounds of reminders with different phrasings were sent through email to the respondents (cf. Sivo et al., 2006). From the sample of 180 firms, 97 responses were received, equating to a 53.8 percent response rate. During the screening process, 4 responses were partially complete, resulting in 93 complete responses that were used for data analysis. The response rates by industry were as shown in Table 2.

7 Analysis and Findings

7.1 Analytical Strategies

The ordinary least squares structural equation modelling (PLS-SEM) implemented in SmartPLS 3.2.7 (Ringle et al.,

Table 1 Indicators used in this study

Latent Variable	Indicators	Measures	Citation source
Cloud Computing Adoption (CCA)	SaaS (CCA1)	Adoption of Software as a Service (SaaS) (CCA1)	(Ahson & Ilyas, 2011; Yang & Hsu, 2011; Zhang et al., 2010)
	PaaS (CCA2)	Adoption of Platform as a Service (PaaS) (CCA2)	
	IaaS (CCA3)	Adoption of Infrastructure as Service (IaaS)(CCA3)	
	CaaS (CCA4)	Adoption of Communications as a Service (CaaS)(CCA4)	
	Remote Data Centers (CCA5)	Presence of remote data centers owned by the firm (CCA5)	
	Virtualized Resources (CCA6)	Utilization of remote virtualized resources (CCA6)	
Organizational Mindfulness (OM)	Preoccupation with Failure (OM1)	• Focus on failure over success	(Dernbecher et al., 2014; Ray et al., 2011; Wolf et al., 2009)
		• Learning from failure	
		• Reporting of failure	
		• Reward for people who spot and report failures	
	Reluctance to Simplify (OM2)	• Extent to which questioning is encouraged	
		• Extent to which people are encouraged to have different views	
		• Appreciation of sceptics	
	Sensitivity to Operations (OM3)	• Extent of information sharing	
		• Accessibility and availability of experts	
		• Availability of additional resources to handle unexpected situations	
		• Communication of operational anomalies as they occur	
		• Sharing of the current operational situation	
	Commitment to Resilience (OM4)	• Commitment to solve any problem that occurs	
		• Ability of people to use their knowledge in novel ways	
		• Availability of informal contacts that can be used to solve problems	
		• Tasks that enable people to learn more about operational processes	
	Under-specification of Structures (OM5)	• Knowledge of people who can solve specific problems	
		• Sharing of knowledge with those who know	
		• Value of experience and expertise over hierarchical rank	
		• People with experience and expertise are freely allowed to make decisions	
Firm Performance (FP)	Revenue Growth (FP1)	Change in company's turnover since the adoption of cloud computing	(Haner, 2002; Zand, 2010)
	Productivity enhancement (FP2)	Change in company's productivity since the adoption of cloud computing	
	Market Share change (FP3)	Significant change in the company's market shared since adopting cloud technology	
	Profitability (FP4)	Company's profitability since the adoption of cloud computing	

Fig. 1 Research model

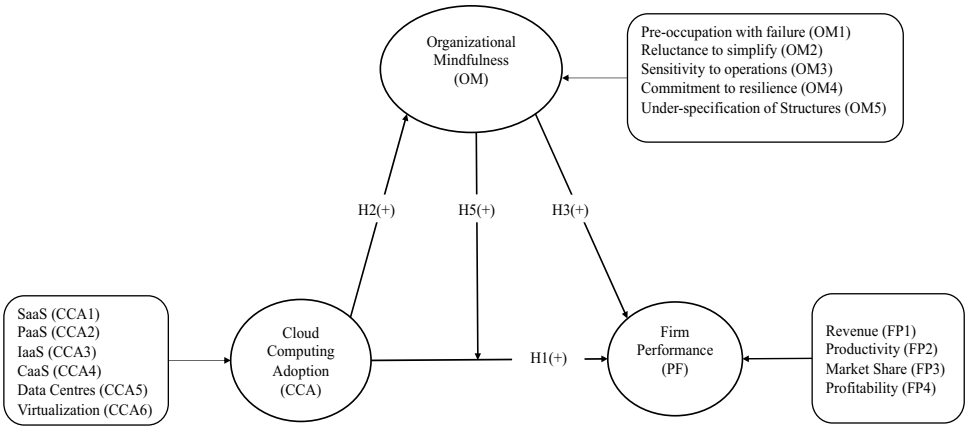

Table 2 Response rate by sector

Industry	Mailed	Response	Response Rate (Industry)	Response Rate (Overall)
Financial	60	33	55%	18.3%
ICT	60	49	82%	27.2%
Manufacturing	60	11	18%	6.1%
Total	180	93		51.6%

2015) was used to test and validate the research model. PLS-SEM provides an approach for estimating complex cause-effect relationship models (Krey et al., 2019). The PLS-SEM estimates model parameters by drawing on latent variables formed from indicators and applies a series of ordinary least squares regressions to maximize the explained variance of the endogenous latent variables (Ringle et al., 2018). PLS-SEM, which has attracted great interest in information systems research (Gefen et al., 2011; Im & Grover, 2004; Urbach & Ahlemann, 2010) was found to be appropriate for this study due to the following reasons: it is robust with small sample size, it is non-parametric and it focuses on prediction (Ringle et al., 2012). PLS-SEM was used to estimate the relationship amongst cloud computing adoption (CCA), organizational mindfulness (OM) and firm performance. It was further used to test for the indirect effects of organizational mindfulness on the relationship between cloud computing adoption and firm performance. Additionally, it was used to test the moderating effect of organizational mindfulness (OM) on the relationship between cloud computing adoption (CCA) and firm performance (FP). The overall suitability for PLS-SEM in this study is its ability to analyze path diagrams with latent variables comprising multiple indicators (Gefen et al., 2011) without any bias on the basis of how the measurement model has been specified, for example reflective or formative (Sarstedt et al., 2016).

The entire model comprising of both the measurement and structural model were evaluated using PLS-SEM.

7.2 Model Evaluation

The measurement model was assessed for reliability and validity. The latent variables of the study; cloud computing adoption, organizational mindfulness and firm performance were modelled as reflective indicators. The tests recommended by Urbach and Ahlemann (2010) for assessing the reliability and validity of reflective measurements were conducted. Internal consistency reliability which measures the degree to which the indicators load simultaneously when the latent variable increases was evaluated using composite reliability (CR) with a threshold value of 0.700 and above (Hair et al., 2011; Latan & Ghozali, 2012). Convergent validity was assessed using the average variance extracted (AVE). The AVE measures the amount that latent variable component captures from its indicators relative to the measurement error and the recommended threshold value is above 0.500 (Hair et al., 2011; Latan & Ghozali, 2012). The indicator reliability which measures how much of the indicators variance is explained by the corresponding latent variable was evaluated using cross loadings with a threshold value of 0.700 or slightly lower for exploratory studies (Chin, 1998). The values for CA, AVE and the cross loadings for the latent variables are summarized in Table 3.

7.3 Extracted Measures

As each pair of factors that represent theoretically different concepts should also be statistically different (Henseler, 2017), it is necessary to test for discriminant validity. In assessing discriminant validity, two criteria have been recommended (Voorhees et al., 2016): The Fornell-Larcker criterion (Fornell & Larcker, 1981) and the heterotrait-monotrait ration of correlations-HTMT (Henseler et al., 2015). The Fornell-Larcker criterion maintains that a

factor's AVE should be higher than its squared correlations with all other factors in the model. All the latent variables of the study met the Fornell-Larcker criterion as shown in Table 4. The HTMT being an estimate of the upper boundary factor correlation, should be significantly smaller than one (1) to discriminate between two factors (Henseler, 2017). The factor correlations between CCA and FP was 0.649, between OM and CCA was 0.517, and between OM and FP was 0.724. All the factor correlations were significantly smaller than one. Further, to ensure that no indicator was wrongly assigned, cross loadings were obtained by correlating the component scores of each latent variable with all the other variables. As shown in Table 4, the loading of each indicator is higher for its designated construct than for any other constructs and each of the construct loads highest within its own items as recommended (cf. Chin, 1998; Latan & Ghozali, 2012).

Table 4 Correlation between Latent Variables and Square Roots of AVEs

Latent Variables	CCA	FP	OM
Cloud Computing Adoption (CCA)	(0.770)		
Firm Performance (FP)	0.588	(0.910)	
Organizational Mindfulness (OM)	0.459	0.659	(0.845)

-Square roots of AVEs are shown on diagonal within parentheses.

7.4 Assessment of the Structural Model

Structural model quality was assessed using several metrics. The first quality to be assessed was the Coefficient of Determinant (R2). R2 is a measure of the explained variance in the endogenous variable. The overall goal is that R2 should be maximized for the model to have a significant level of explanatory power (Hair et al., 2017). Following a rule of thumb, the explanatory strength of R2 values are; 0.750 for substantial, 0.50 for moderate, and below 0.25 is considered weak (Hair et al., 2011; Henseler et al., 2009). The R2 for firm performance (FP) was 0.617 indicating a moderate explanatory power while that of organizational mindfulness (OM) was 0.256 implying a weak explanatory power.

The path coefficients, which accounts for the variability in an endogenous variable resulting from a unit change in an exogenous variable while holding all other exogenous variables constant, were examined for direction, magnitude, and significance. The direct path coefficients of the model (see Table 5) were all greater than 0.100 and therefore accounted for a substantial impact on the model (Urbach & Ahlemann, 2010). The path coefficient for the moderating effect was below 0,100 (0,014). Next, the significance of the path coefficients was examined through the bootstrapping technique (Helm et al., 2010). The bootstrapping algorithm extracted 500 subsamples from the original dataset and ran 300 iterations to generate the T statistics and p values (see Table 5).

In addition to assessing the R2 value, the effect size, which evaluates the extent to which an omission of a particular exogenous construct leads to a change in R2, was calculated using Cohen's f^2. To calculate the value of f^2, Cohen's (1988) guidelines for exogenous variables were used. According to the guidelines, values of between 0.020 and 0.150, between 0.150 and 0.350, and those exceeding 0.350 indicate that an exogenous latent variable has a small, medium, and large effect respectively on an endogenous

Table 3 Cross loadings, Cronbach's Alpha, Composite Reliability and Average Variance

	Cloud Computing Adoption (CCA)	Firm Performance (FP)	Organizational Mindfulness (OM)	CA	CR	AVE
CCA1	0.887	0.538	0.420	0.846	0.89	0.594
CCA2	0.808	0.457	0.389			
CCA3	0.867	0.492	0.330			
CCA4	0.871	0.545	0.435			
CCA5	0.274	0.160	0.091			
CCA6	0.733	0.409	0.338			
FP1	0.496	0.895	0.591	0.931	0.900	0.828
FP2	0.577	0.907	0.618			
FP3	0.510	0.908	0.581			
FP4	0.553	0.929	0.607			
PF	0.298	0.383	0.544	0.891	0.923	0.713
RI	0.332	0.575	0.894			
SO	0.388	0.592	0.919			
US	0.426	0.606	0.910			
CR	0.470	0.594	0.893			
OM*CCA				1.000	1,000	1,000

Table 5 Path Coefficients and their Significance

Latent Variable	Path Coefficient	T-Statistic (alpha = 0.05)	P-Values
CCA- > OM	0.506	4.393	0.000
OM- > FP	0.532	4.256	0.002
CCA- > FP	0.379	3.571	0.001
OM*CCA- > FP	0.014	0.032	0.430

Table 6 Exogenous Variables on Endogenous Variables

Latent Variables	f^2 (effect size)	Q^2 (predictive relevance)
CCA- > FP	0.224	0.354
CCA- > OM	0.266	0.142
OM- > FP	0.370	0. l27
OM*CCA- > FP	0.000	1.000

latent variable. The Cohen's f^2 was estimated by means of bootstrapping and the results are presented in Table 6. The exogenous variable CCA had a medium effect on the endogenous variables FP and OM while the variable OM had a large effect on FP.

Another important structural model validity criterion that was assessed is the predictive relevance of the model. This criterion was evaluated by performing the Stone-Geisser's Q^2 test (Geisser, 1974; Stone, 1974) through the blindfolding procedure. The omission distance in the blindfolding procedure was set to Seven (7) because the dataset used in the model estimation had 93 observations (n = 93). This follows the recommendation of Hair et al. (2014) which states that the omission distance should be between 5 and 7 provided that the total number of observations (n = 93) used in the model estimation divided by the omission distance (d) does not result to an integer. The Q^2 values of all the predictor latent variables were above 0 ($Q^2 > 0$) threshold suggested by Fornell and Cha, 1994 (as cited in Urbach and Uhlemann, 2010). This implies that each exogenous latent variable had predictive relevance. Table 6 summarizes the f2 and Q2 of exogenous variables on endogenous variables.

The overall measurement model fit was assessed to ascertain the goodness of fit of the entire model. The overall measurement model fit X^2 was (89, N = 93) = 186.29, p < 0.5; SRMR = 0.071; NFI = 0.838. The results indicate that SRMR was less than the selected cut-off value of 0.08 (Kline, 2010) and thus demonstrate an acceptable fit. Again, the closer the NFI value to 1, the better the fit (SmartPLS GmbH, 2020). Overall, the results confirm a reasonably good fit for the measurement model. Recently, researchers have been concerned about errors which arise when the structural error term for an endogenous variable is correlated with any of the variable's predictors. To control for such errors, a test of endogeneity is recommended (Papies et al., 2017; Sande & Ghosh, 2018). Endogeneity refers to situations in which an explanatory variable in a multiple regression- type setup correlates with the disturbance term (Sande & Ghosh, 2018). According to Koch (2017), if there is a path from the predictor variable suspected to be the source of endogeneity to the endogenous variable, then the problem of endogeneity does not arise. In this study, the possible source of endogeneity would be the latent variable CCA. But since there is a theoretically supported link between CCA and the endogenous variable FP, it is concluded that the model does not suffer endogeneity.

7.5 Hypothesis Testing

The aim of this study is achieved by testing the five hypotheses. The hypotheses were informed by extant theories and empirical studies. The hypotheses were evaluated using the PLS-SEM technique. While there are several PLS-SEM software applications, this study used the SmartPLS 3.2.1. The path coefficients (β), T statistics (t) and P values are presented in Table 5 while the effect sizes (f^2) and predictive relevance (Q^2) are presented in Table 6.

The first hypothesis stated that there is a positive relationship between cloud computing adoption (CCA) and firm performance (FP). Both the CCA and FP were latent variables composed of Six (6) and Five (5) reflective indicators, respectively. The measures were β = 0.379, t = 3.093 (significant level = 5%), f2 = 0.224 and q2 = 0.354. The positive relationship between CCA and FP was found to be significant (t > 1.96). The hypothesis that there is a positive relationship between cloud computing adoption and firm performance was supported.

In the second hypothesis, the positive relationship between cloud computing adoption (CCA) and organizational mindfulness (OM) was evaluated. The latent variable OM was measured in terms of Five (5) reflective indicators. The measures were β = 0.506, t = 4.282 (significant level = 5%), f2 = 0.226 and Q2 = 0.142. The positive relationship was found to be significant (t > 1.96). The hypothesis that there is a positive relationship between CCA, and OM was supported.

The third hypothesis was that a positive relationship exists between organizational mindfulness (OM) and firm performance (FP). The measures were β = 0.532, t = 2.958 (significant level = 5%), f2 = 0.416 and q2 = 0.127. The positive relationship between OM and FP was found to be significant (t > 1.96). The hypothesis that there is a positive relationship between OM and FP was supported. A summary

of the path coefficients, indicator loadings and the R2 for the research model are presented in Fig. 2.

The fourth hypothesis that organizational mindfulness (OM) has a mediating effect on the relationship between cloud computing adoption (CCA) and firm performance (FP) was evaluated following the mediation analysis procedure in Fig. 3. The first two steps were accomplished by testing the statistical significance of the indirect effect and the direct effect. Both the effects were found to be significant as shown in Table 7.

In the third step, the researcher confirmed that the product of the path coefficients of CCA- > OM (0.506), OM- > FP (0.532) and CCA- > FP (0.379) was 0.102 which is positive. It was therefore concluded that OM had a partial mediation on the relationship between CCA and FP. The indirect effect of the mediation was significant ($p = 0.003$, $p < 0.05$).

The fifth hypothesis was that organizational mindfulness (OM) positively moderates the relationship between cloud computing adoption (CCA) and firm performance (FP). To model the moderating effect, an interaction term (OM*CCA) was used to express the joint influence of OM and CCA on FP as proposed by Becker et al. (2018). This hypothesis was tested as a way of exploring if the relationship between CCA and FP is a function of OM. The measures for path coefficient were $\beta = 0.014$, $t = 0.177$ (significant level = 5%), $f2 = 0.000$ and $Q2 = 1.000$. The moderating role of OM on the relationship between CCA and FP was found to be insignificant ($t < 1.96$) and therefore not supported. A summary of the results of the hypotheses tests is presented in Table 8.

8 Discussion

The motivation of the study was to discover the mechanisms through which cloud computing adoption impacts firm performance in the context of the private sector in Kenya, a developing country. While there could be possible factors that explain how cloud computing adoption is related to firm performance, in the present study, the role of organizational mindfulness was explored. In particular, the study provided an empirical test of the mediating and moderating role of organizational mindfulness on the relationship between cloud computing adoption and firm performance. Overall, this study provides support for the relevance of the research model (Fig. 1). In general, the proposed model (Fig. 1) meets an adequate level of statistical fit. The model predictive relevance for all the latent variables estimated through the Stone-Geisser's Q^2 test yielded a result of $q2 > 0$ as recommended (Table 8). Hypotheses H1-H4 were supported while hypothesis 5 was not supported. The model is therefore considered to be useful in explaining the process of how cloud computing adoption impacts firm performance through organizational mindfulness within the context of firms in Kenya. The R2 for the structural model was 0.256 for organizational mindfulness (OM) indicating a weak explanatory power while that of firm performance (FP) indicated a moderate explanatory power at 0.617 (Fig. 2).

The results of this study provided support for the positive relationship between cloud computing adoption and firm performance. While there has been considerable debate on whether IT innovation adoption is paying off in terms of

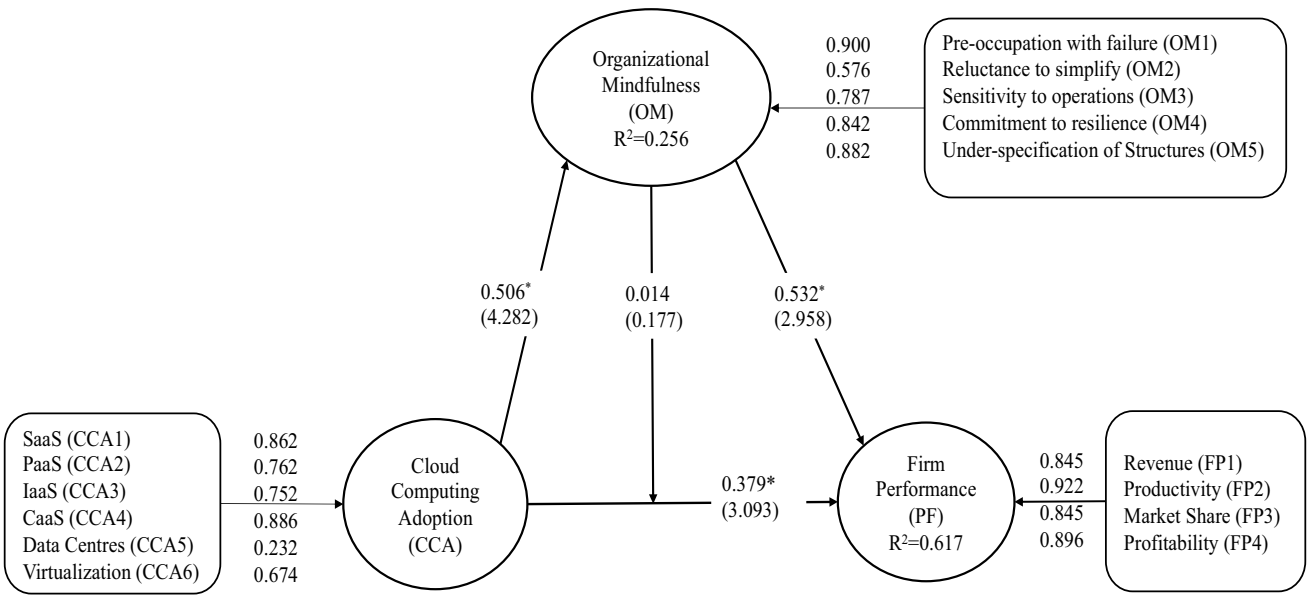

Fig. 2 Path coefficients, indicator loadings and R2

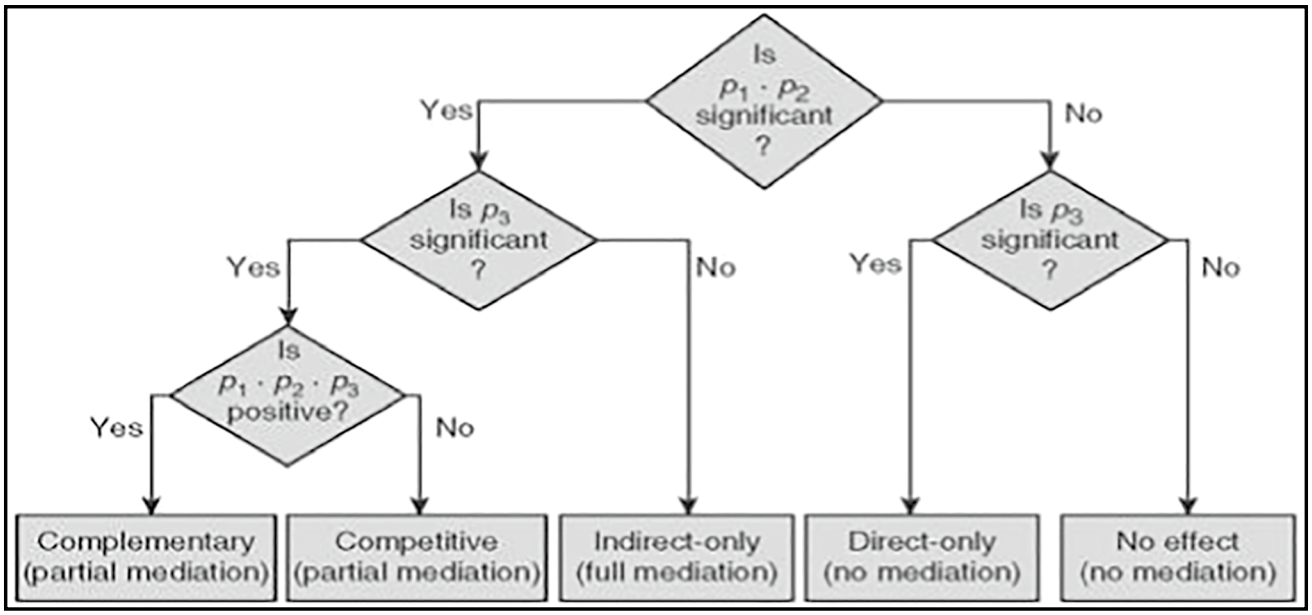

Fig. 3 Mediation analysis procedure (Hair et al., 2016)

Table 7 Statistical significance of indirect and direct effects

Relationships	Sample Mean	SD	T Statistics	P values
Cloud Adoption—> Organizational Mindfulness—> Firm Performance	0.227	0.066	2.762	0.003
Cloud Adoption—> Firm Performance	0.490	0.116	6.302	0.000

Table 8 Summary of hypotheses tests

#	Hypothesis	Path Coefficient	T-statistic	P Values (alpha < 0.5)	Comment
H1(+)	CCA-> FP	0.506	3.093	0.001	supported
H2(+)	CCA—> OM	0.532	4.282	0.000	supported
H3(+)	OM—> FP	0.379	2.958	0.002	supported
H4	CCA—> OM-> FP	0.102 (+Ve)	2.762	0.003	supported
H5(+)	(CCA*OM)—> FP	0.014	0.177	0.430	Not supported

productivity growth, the results have not been conclusive. A number of studies reported negative impacts during one to two years after implementation of various IT innovations (Hitt et al., 2002; Nicolaou, 2004) while others reported positive impacts (Cotteleer & Bendoly, 2006; Hendricks et al., 2007). The negative impacts reported during the initial periods of IT implementation can be attributed to the fact that investment in digital technologies should be coupled with other complementary investments, for example, new business strategies, new business models and new ways of organizing to reap maximum benefits (Brynjolfsson & Hitt, 1998). Additionally, the organizations will require to go through a period of re-engineering and restructuring to best utilize the implemented IT. This change may require some time, thus the time lag between IT investment and productivity. The organizational adaptation necessitated by cloud computing adoption would vary from one organization to another depending on each organization's contextual specifics. Organizational mindfulness enables an organization to be flexible and reliable in enacting organizational routines (McAvoy et al., 2013) resulting from cloud computing adoption within its own contextual specifics.

This study supports the findings of previous studies that investigate the relationship between cloud computing adoption and firm performance. A study on the economic worth of cloud computing concluded that its adoption does provide some financial impact on the adopting firms (Nicholas-Donald, 2015). Another study on the economic

benefits of cloud computing indicated that cloud computing adoption announcements by firms was associated with positive increments in the market value of the firms (Son et al., 2011). Hendricks et al. (2007) showed that results of profitability accruing from cloud computing adoption were stronger in the case of early adopters. In a study on cloud computing usage and its effect on firm performance, there was evidence that cloud usage improved firm performance (Gangwar, 2017).

The second hypothesis shows that the positive relationship between cloud computing adoption and organizational mindfulness was supported. From the results, it can be concluded that cloud computing adoption facilitates organizational mindfulness. The amplifying role of IT innovations on organizational mindfulness has been investigated along the contours of IT use and outcomes. Given that IT-intensive organizations share same characteristics with HROs, IT-intensive organizations need to develop a sense of mindfulness (Valorinta, 2009). As cloud computing adoption creates uncertainty regarding risks associated with it, organizations that adopt it implicitly grow in mindfulness. Studies have shown that mindfulness matters most when uncertainty exists (Sun et al., 2016). As IT innovations are characterized by high uncertainty on their future evolution, it is important to enable mindfulness through organizational learning during and post its adoption (Häckel et al., 2017). Generally, firms that adopt emerging IT innovations (i.e., cloud computing) tend to manifest mindfulness characteristics to pre-empt any possibility of failure. In the context of Kenya, most firms in the financial and ICT sectors rely heavily on IT innovations to deliver their services. These firms have developed in house capacity or rely on third party vendors with the capacity to ensure availability and reliability of the cloud services.

The third hypothesis shows that the positive relationship between organizational mindfulness and firm performance was supported. Mindfulness is an organizational characteristic that enables organizations to achieve reliable performance in changing environments (Butler & Gray, 2006). Organizational mindfulness focuses on an organization's ability to perceive cues, interpret them, and respond appropriately. Furthermore, it is argued that organizational mindfulness provides a wider response portfolio, better process awareness and stronger accountability, which can lead to superior organizational performance (Weick et al., 1999). Previous studies on organizational culture indicated that there is a relationship between organizational culture and firm performance. Organizational mindfulness is an aspect of organizational culture that encourages rich thinking and a capacity for action (Ray et al., 2011).

Most of the firms that participated in this study are multinationals whose parent organizations are based outside Kenya. It is likely that the firms adopt the cultures of their parent organizations. The cultures of the parent organizations are aimed at ensuring that the organizations survive the turbulent international markets. These firms may have therefore inherited a mindful organizational culture from their parent companies. Moreover, organizational mindfulness is a dynamic capability (Wolf et al., 2012) that may enable firms to deal with uncertainty, eventually leading to above-average cloud business value generation. Organizational mindfulness plays a significant role in a firm's market performance (Bayraktar & Ndubisi, 2014). In the banking sector, organizational mindfulness has been found to play a role as a discriminating factor for firm performance (Eastburn, 2018).

The fourth hypothesis shows that organizational mindfulness has a mediating effect on the relationship between cloud computing adoption and firm performance was evaluated and resulted in a significant partial mediation. The hypothesis was that cloud computing adoption influences firm performance through organizational mindfulness. Regarding the question on how to innovate with IT, Swanson and Ramiller (2004) propose that organizations need to mindfully attend to their facts and specifics. Given that adoption of IT innovations, like cloud computing may be influenced by bandwagon behavior at initial stages, mindfulness enables organizations to make discriminating decisions to successfully resist bandwagons. The benefits of mindfulness which include expanded scanning and context relevant interpretation are beneficial for innovation performance (Fiol & O'Connor, 2003). In order for firms to benefit from their digital initiatives, managers need to mindfully assess sociotechnical, strategic and risk aspects of such initiatives (Grover et al., 2018). Therefore, for organizations to improve their performance through IT innovations, they must build up a systematic process for developing mindfulness. Further, if members of an organization are mindfully able to comprehend the strategic implications of IT innovation adoption, the organization performance would be better.

The fifth hypothesis was on the moderating effect of organizational mindfulness on the positive relationship between cloud computing adoption and firm performance. The study's motivation to explore this hypothesis was based on studies that have indicated that mindfulness can moderate the relationship between theoretical constructs (Dernbecher & Beck, 2017; Sun et al., 2016; Timmerman, 2002). Further, studies have argued for mindful adoption as part of the implementation strategy to generate business value from IT innovations (Culnan et al., 2010; Khan et al., 2013). The study found that that organizational mindfulness had a small and insignificant moderating effect (0.014) on the relationship between cloud computing adoption and firm performance. This result may have occurred due to the ceiling effect, implying that the main relationship between cloud computing adoption and firm performance is already strong

enough thus leaving little room to enhance it. This situation confirms previous studies regarding the ceiling effect (Sun et al., 2016; Venkatesh et al., 2003). The small moderating effect is also not surprising as studies show that moderating effects are usually small (Becker et al., 2018) with an average of 0.017 in management studies (Aguinis et al., 2005).

8.1 Implications for Research

While the results of this study highlight the value of organizational mindfulness as an enabler of cloud technology and IT in general, the findings have implications for research. Firstly, the study extends the application of organizational mindfulness beyond acting as an enabler to that of acting as an accelerator between an IS construct and an organizational construct (Dernbecher & Beck, 2017). While previous studies have mainly examined the enabling role of organizational mindfulness, that is, treating organizational mindfulness as an independent variable, this study explored the accelerating role of organizational mindfulness, treating it as both a mediating and a moderating variable. This approach therefore extends the literature on the application of organizational mindfulness in IS research as a response to previous calls to action for the exploration of mindfulness in IS research.

Secondly, findings from previous studies have shown that cloud computing adoption enhances firm performance, yet it remains unclear how such adoption translates to positive organizational impacts. This study contributes to the effort of understanding the mechanisms through which cloud computing adoption translates into improved organizational performance through the route of adoption, organizational mindfulness, and firm performance. We achieve this by formulating and testing a complete mediated and moderated nomological net that postulates a causal link between cloud computing adoption, organizational mindfulness, and firm performance (cf. Wu et al., 2015).

Thirdly, the findings of the study reveal that succeeding with emerging technologies like cloud computing is a socio-technical phenomenon (Wang et al., 2022) that involve the orchestration of technology, people, and processes. By exploring the role of organizational mindfulness in the successful adoption of IT innovations, this study adds into the body of literature that continue to examine the different mechanisms through which IT innovations like cloud computing can be orchestrated to improve organizational performance. We contend that organizational mindfulness could just be one of the many ways through which organizations can enhance their performance through adoption of IT innovations like cloud computing.

Lastly, the pace and direction of IT innovation and the resulting organizational restructuring are mainly set by developed countries, primarily in North America and Europe (Avgerou, 2008). The results from studies conducted in developed countries may not adequately reflect the nuances of national and organizational cultures in developing countries. This could result from the differences in contextual factors that can exert direct and indirect influence on a phenomenon such as IT adoption and use. By conducting the study in Kenya, a developing country, and by introducing organizational mindfulness as contextual phenomenon, our study contributes to cross-context theory replication (cf. Hong et al., 2014).

8.2 Implications for Practice

As organizations increasingly rely on cloud computing technologies to manage and improve services, IT practitioners and managers are concerned with how the adoption of these technologies can translate to positive organizational performance. While there are myriad studies indicating that cloud computing adoption has positive impacts on organizational performance, this study explored the mechanism through which managers can orchestrate cloud computing services with other organizational resources like mindfulness to attain positive impacts. The goal of IT innovation research should be to provide guidance to managers on the questions such as whether, when, and how to innovate using technology (Swanson & Ramiller, 2004). Through mindfulness, an organization can discern how to innovate with cloud computing, while being cognizant of its organizational and external environments. The results of the study indicate that managers would benefit by investing in the creation of an organizational mindfulness culture, to enable their organizations to successfully reap benefits from adoption of cloud computing. Given that cloud computing adoption decisions are complex (Opara-Martins et al., 2016) and therefore requires creativity, managers are advised to consider mindfulness as a criterion for job selection (Cheung et al., 2020). Further, managers can offer training to guide employees on how to best exercise mindfulness in a way that is beneficial to both the employee and the organization (Chong et al., 2020).

9 Conclusion

This study examined the mediating and moderating roles of organizational mindfulness in the relationship between cloud computing adoption and firm performance across private sector organizations in Kenya, a developing country. The findings reveal that organizational mindfulness positively influences the successful adoption and implementation of cloud technology, and IT innovations in general. By using organizational mindfulness as a theoretical

lens, the study advances understanding of how organizations in developing countries can adopt and benefit from IT innovations.

As with all research, we acknowledge limitations of this study. First relates to the challenge of generalizability from a Kenyan case context to developed countries. However, the use of 180 organizations operating in key sectors of the Kenyan economy resonate with other developing countries and emerging markets. Nevertheless, future research could conduct cross-country or regional analysis between developing countries, as well as developed countries. A second limitation is that the differences in organizational culture amongst the organizations studied outside the scope of this study. The reason being that organizational mindfulness may be embedded as part of an organization's culture and it would be difficult to separate it from the general organizational culture. Since organizational mindfulness is embedded in the general organizational culture, it is unlikely that this limitation greatly affected the results. Future research could further examine the processes through which adoption of IT innovations impact organizational performance and the role of organizational mindfulness could be integrated with other process theories. To this end, organizations as adopters of emerging technologies need to be mindful of their organizational readiness to adopt technologies that have the potential for organization-wide digital transformations.

Declarations

Conflict of Interest The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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